DOCUMENT RESUME

ED 298 903 IR 013 288

AUTHOR Osterman, Dean
TITLE Designing an Alternative Teaching Approach (Feedback Lecture) through the Use of Guided Decision-Making.
PUB DATE 84
NOTE 27p.; In: Instructional Development: The State of the Art, II; see IR 013 273. For volume I, see ED 292 444.
PUB TYPE Guides - Classroom Use - Guides (For Teachers) (052) -- Reports - Research/Technical (143) -- Tests/Evaluation Instruments (160)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Case Studies; Decision Making; *Discussion (Teaching Technique); *Feedback; Higher Education; *Instructional Development; Instructional Effectiveness; *Lecture Method; Problem Solving; Study Guides; *Teaching Methods
IDENTIFIERS *Guided Design Approach (Teaching)

ABSTRACT

This chapter explains how the Guided Design method of teaching can be used to solve problems, and how this method was used in the development of a new method of teaching. Called the Feedback Lecture, this method is illustrated through an example, and research data on its effectiveness is presented. The Guided Decision-Making Process is also illustrated, and its use by five university faculty members and an instructional development consultant in developing the Feedback Lecture is described. It is noted that the Feedback Lecture involves the use of study guides, lecture outlines, pretests and posttests, and organized discussion to promote feedback at the midpoint of the lecture, and a case study of a feedback lecture is presented. Six figures and the questionnaires used in the case study are included. A study guide for a course on the economic aspects of clothing is appended. (13 references) (Author/EW)

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Chapter 15

Designing an Alternative Teaching Approach (Feedback Lecture) Through the Use of Guided Decision-Making

Dean Osterman

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The following chapter explains how the Guided Design method of teaching can be used to solve problems, and how this method was used as an ID technique in the development of a new method of teaching. This method, called the Feedback Lecture, is illustrated through an example, and research data on its effectiveness is presented.

INTRODUCTION

This paper focuses upon two discussions pertinent to redesigning the traditional lecture form of teaching and learning. One description provides the reader with the **process** (Guided Decision-Making Strategy) used by a team of instructors and the author to design and develop the **product** (Feedback Lecture; a newly-created instructional approach developed at Oregon State University). The product, the other description, is discussed as it exists in its present, developmental stage and the research conducted on its effectiveness is presented.

USING GUIDED DECISION-MAKING (THE PROCESS)

Guided Decision-Making, as developed by Charles E. Wales, West Virginia University and Robert A. Stager, University of Windsor, is a teaching/learning approach involving small-group discussion, problem-solving activities related to real-world situations, and increased opportunities for motivating students. Guided Decision-Making is an educational strategy, part system, part attitude. It reshapes the traditional lecture approach by having small groups of students working together on open-ended problems provided by the instructor. It is based upon the conviction that the student who works through an ascending order of well-designed problems and who actively seeks solutions to problems rather than passively assimilating knowledge will emerge not only better educated but far stronger intellectually (Wales and Stager, 1976).

Although Guided Decision-Making is designed to be a method of teaching, its strategy can be adapted for other uses. As an example, Guided Decision-Making has been used as a process for resolving problems confronting departments or administrations. Problems facing instructors are identified, such as large student populations, limited budgets, inconvenient teaching facilities and many other frustrations. Guided Decision-Making can facilitate the improvement of these situations by helping participants to sort out the possibilities from the impossibilities. The strategy aides them in arriving at one or more possible decisions which can be implemented. The individual steps of Guided Decision-Making allow an instructional developer to work with faculty members in reaching necessary solutions. The strategy guides the instructional developer towards the shaping of good, better, and best solutions through the use of a structured format to be used in consultation with faculty members.

The design as indicated in Figure 15-1

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demonstrates the flow of Guided Decision-Making. The steps are described in Figure 15-2.

The design and its steps are helpful to groups of instructors attempting to arrive at solutions to specific problems. An example of this strategy is described in a later section entitled Using Guided Decision-Making to Design the Feedback Lecture.

GUIDED DECISION-MAKING AS A TEACHING APPROACH

Dissatisfaction with the traditional lecture method of transmitting knowledge has led to the development of new teaching techniques which place the student in a more active role in the

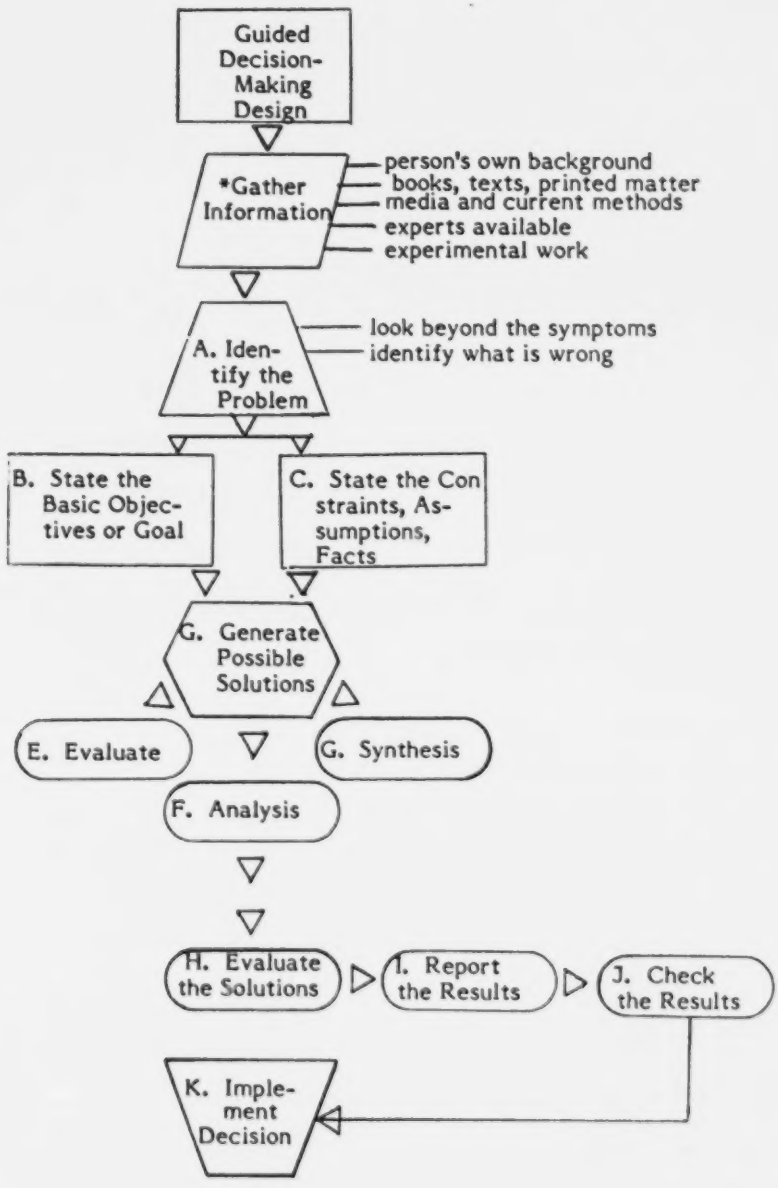

Figure 15-1. Flow chart.

Figure 15-2. Steps in Decision-Making.

-- **Gather Information**

This step is listed because it is usually a component of each step in the decision-making process. It involves a search for pertinent information from the person's own background, books, printed matter, media, other people, experts and experimental work.

A. **Identify the Problem**

Someone may ask you to solve a problem or you may discover it by yourself. In either case you must learn to look beyond the symptoms of the problems to find out what is wrong.

B. **State the Basic Objective or Goal**

The Basic Objective focuses your thoughts on the real problem to be solved; it should be a statement which is broad enough so no reasonable possible solution is eliminated.

C. **State the Constraints, Assumptions and Facts**

Constraints are factors which affect the outcome of the project and cannot be changed. Assumptions are applied to factors which can be changed to simplify the problem and make it solvable. Facts are statements of things that are known.

D. **Generate Possible Solutions**

This is the time for creative thinking. Don't prejudge ideas as they are generated; get all the different thoughts you can.

E. **Evaluate and Make a Decision**

Determine which possible solution is most likely to solve the problem.

F. **Analysis**

Separate the chosen possible solution into meaningful elements. Determine and gather the information you need to develop each element.

G. **Synthesis**

Combine the elements to create a detailed solution.

H. **Evaluate the Solution**

Does it satisfy the basic objectives; is it feasible, practical, economical, safe, legal, and moral?

I. **Report the Results and Make Recommendations**

Prepare a report that describes what you have done and decided. Think about the information needs of the person who will read the report. Don't write what isn't necessary. Do write all that is necessary.

J. **Implement the Decision**

What should be done? Should we select a new basic objective, perform additional decision-making or research work, or begin to implement the recommended solutions?

K. **Check The Results**

Did the solution work? Is further 'design' effort required?

educational process, rather than simply leaving him as a consumer of facts which rapidly become dated. Students need guidance in the complex process of problem-solving, and Guided Decision-Making provides this sort of guidance. To illustrate this sequential problem-solving process, the author has provided an example of a Guided Decision-Making project which traces the work of a group of instructors seeking a new design for the lecture format.

The learning process in Guided Decision-Making revolves around the students' efforts to devise solutions for a series of carefully designed open-ended problems. While there is no single correct answer to any of the problems, each requires students to put into play specific information and skills in order to develop a feasible solution. The instructor selects the problems according to the skills and subject-matter the students should learn and prepares written instructional feedback material which guides them through a "model" solution.

The manner in which students deal with the problems is carefully organized. Each problem is broken down into a sequence of problem-solving steps. Students must deal with each step in a pre-established order and are not permitted to progress to a new step until they have adequately considered and dealt with the preceeding one. Students work in class in groups of from four to seven members, and it is as a group that they formulate their own plan for tackling each step. As intended by the professor in his selection and sequencing of the problem, the group quickly discovers that certain information is needed in order to make appropriate decisions. These needs have been anticipated by the preparation of a library of materials--traditional and programmed texts, reference books, audio-tapes, etc.--which students are expected to consult.

The solution of a given open-ended problem may take only one week of class time or as long as five weeks. During this period of time the students are expected to study and learn the same amount of subject-matter that would normally have been considered in a traditional class. Tests on this material are given in the usual way. However, the students' motivation to learn is improved, because at least part of the subject-matter is required in order to produce an effective solution to the problem chosen by the professor. Thus, this information is always brought back to the group, providing optimum conditions for group problem-solving, with its give-and-take of ideas, insights, and opinions.

When the group has decided upon its action for the decision-making step under consideration, it is given written feedback material, prepared in advance by the professor. The material presents one or more possible decisions the group may have reached by this point, elaborating upon the strengths and weaknesses of each. After the students compare the "pros" and "cons" of their decision with the arguments given by the professor, they are allowed to advance to the next step in the problem.

By focusing upon both decision-making and the acquisition of knowledge, Guided Decision-Making brings knowledge alive as the tool of an active mind seeking orderly solutions to complex problems. The open-ended nature of Guided Decision-Making problems and the stress upon group problem-solving makes this approach a close approximation to "real life" experience, in which few problems are susceptible to a single, black-or-white solution, and in which many different opinions and values must be considered and reconciled in the decision-making process. In summary, under this approach, students not only acquire knowledge within the discipline but also develop their ability to learn on their own, think logically, gather the information they need to make intelligent decisions, make value judgments and communicate their ideas to others. (Wales and Stager, 1976).

USING GUIDED DECISION-MAKING IN INSTRUCTIONAL DEVELOPMENT

Guided Design can be used in the Instructional Development process as a method for dealing with problems inherent in teaching.

Consulting together, a team of instructors together with the author set out to devise solutions for resolving problems involved with the traditional lecture. It was decided to use the Guided Decision-Making Strategy. With no written materials (instructional feedback) prepared in advance, such as would be available in most Guided Decision-Making classroom experiences, the group used the decision-making strategy to arrive at the new teaching approach, The Feedback Lecture.

USING GUIDED DECISION-MAKING TO DESIGN THE FEEDBACK LECTURE

The sample project used as an example below demonstrates a Guided Decision-Making project and shows how it appears when ready for classroom use. Additionally, it serves as a model, recording the steps of a faculty group which set out to improve the lecture by consulting with an instructional developer. For classroom use, students are provided with an "Introduction to the Process of Decision-Making," presented in Figure 15-3.

This model of decision-making, then, was used as the method for arriving at the solution to problems associated with the conventional form of teaching.

WHAT CAN BE DONE TO IMPROVE THE LECTURE?
Guided Decision-Making Project

A. Identify the Problem

Five Oregon State University faculty members plus the author, an instructional developer, assemble to discuss the problems associated with the conventional teaching approach. The lecture

Figure 15-3. An introduction to the process of decision-making.

The material you are about to use is concerned with decision-making--a basic intellectual process which makes it possible for each person to face and solve new problems. This material presents a sample problem designed to introduce you to the basic steps in the decision-making process.

The printed pages in this project are organized in an "Instruction-Feedback" pattern so you can participate in the solution of the problem. Each instruction presents a question which has been raised by a group about one step in the decision-making process. We suggest that each member of your group read each Instruction, discuss it with the group, decide upon a response, and then compare your decision with the printed Feedback which your teacher will provide. This Feedback provides a summary of what your group has probably discussed and represents the decision made by the group. You should realize that the purpose of the printed Feedback is to allow everyone to compare their reasoning with that of other people. No one should feel that they have to accept any of these decisions.

The secretary for each group should record the decisions made by her or his teammates. When the group feels that it has completed its answer to the question asked in the Instruction, ask the instructor to come to the group to check the work or have the secretary take the record to the instructor. If the instructor believes the work is acceptable, the secretary will receive copies of the Feedback and the next Instruction to give to the group. If the work is not yet acceptable, the teacher may ask questions to stimulate further thought.

form of delivery is the main vehicle used by them for instruction. Classes range from 60 to 100 or more students, and instruction is conducted in auditoriums large enough to accommodate the large numbers of students who are required to take the courses. Both majors and non-majors take the courses. The courses are often rotated among the instructors. Students rate the courses extremely low. Teachers instructing subsequent courses report that retention is very small. The other identifiable problems are students missing lectures, poor rest results, too much content covered, poor course-continuity from instructor to instructor, double coverage of material, boredom on the part of majors, overwhelmed non-majors, and general lack of enthusiasm, direction and self-fulfillment.

After the group (consisting of Geoff, Lize, Susie, Ella, Margy, and Dean) discussed the symptoms, they decided to pin down the problem. If you were a part of this group, what would you identify as the problem?

Feedback A. Ella remarked that there is too much content for the course; "We have thirteen objectives for one lecture alone; how can we cut down on the content for the course?" Susie remarked, "Why don't we divide the courses into two; one for majors and one for non-majors?" After further discussions the group felt that these again were symptoms of the underlying problems. The real problem facing the students and instructors is the **teaching method.** It lacks student involvement, specific objectives, immediate feedback to students, intellectual stimulation, and any sort of self-actualization--i.e., making use of students' talents, capacities, potentialities, and energy. The instructional developer, Dean, thought that it would be useful to gather further information concerning the problem prior to concluding the discussion.

B. Gather Information

Geoff suggested that it might be useful to gather information regarding any pertinent data the students taking the courses might be able to offer, as well as comments from past course evaluations and from other people involved with the course. Susie suggested that perhaps first, "It might be best to generate a list of questions to help review what we need to look for in available data; then we would have a better picture of what further symptoms exist; this might suggest alternative teaching forms to study."

If you were part of this group, **what questions would you ask to get the information you need?**

Feedback B. Margy cautioned, "I don't think we should jump to quick responses like we did earlier when we were identifying the problem. Liza, you haven't spoken yet, what do you think should be asked?"

Liza presented the following list of questions:

1. What was wrong with the old approach; why don't teachers and students like it?
2. What suggestions have been offered to improve the lecture format?
3. Why can't other alternative approaches be used? What does the information from student evaluations or peer observations indicate?

Dean added a few more questions to the list:

4. How much student involvement has there been in the past?
5. Does the present teaching-learning approach guide the students' learning?
6. Does the present form of instruction provide for practice in terms

of applying subject content to real situations?

7. What are the objectives of the course? Are they realistic and/or related to best teaching methods?
8. Is students' work evaluated often and are they given feedback?
9. Are students motivated?

Susie said, "Let's start now to find the answers to these questions."

C. State the Goal of the Work

The group studied the list of questions and determined the answers by reviewing the needs-assessment responses and from other available data from students and teachers of the courses. Susie prodded the group along by briefly summarizing the answers to the list of questions. "Why don't I answer these questions orally with the information we gathered?" She provided the following summary:

1. "The students didn't like the old approach because it was inflexible, no questions could be asked, it covered too much material, and no one seemed to know what to expect.
2. The most useful suggestions to improve the course centered around the subject-matter, delivery methods, and course organization. Students were either bored or overwhelmed; perhaps the course could be reconstructed.
3. Other alternatives such as Personalized Systems of Instruction (PSI), Audio-Tutorial, and Guided Decision-Making could not be used due to the large enrollment, limited facilities, and the absence of proctor or tutor assistance. However, it would be possible to use components of each of these alternatives.
4. Student involvement in the past form of teaching and learning has been limited to notetaking, two papers, a mid-term, and final. The role of the student has been passive; the expectation has been for students to memorize content.
5. Students are expected to provide their own direction.
6. No provisions for practice have been offered.
7. The objectives of the course are loose and difficult to measure. Perhaps there are too many. The learner is expected to know what is presented.
8. Students' work is not evaluated often and little feedback, other than a final grade, is provided.
9. Students report that they have little motivation."

"Before we go further," said the instructional developer, "we should put this information together and decide what we expect to do." Ella responded, "Okay, let's decide what the goal(s) of work would be." **What goal or goals would you expect to accomplish through this group work?**

Feedback C. The group decided that their objective would be to select or develop a new teaching approach. "There may be an appropriate teaching/learning format already in use," posited Margy. Susie felt that the expertise of the group would help to determine if any form of teaching other than lecturing would work in their environments.

D. Generate Possible Solutions

Susie began by stating, "Let's find the approach; how about computer-assisted instruction?"

"Wait a minute!" cautioned Ella. "Why don't we look at several teaching methods before we go on; tell me about all the methods that might be available."

Generate a list of all possible teaching methods that might handle the symptoms of the courses.

Feedback D. Susie was quick to respond with a list, and Geoff, Dean, and Margy each listed a few. Some of the suggestions were serious, some were not. Their list consisted of the following:

Guided design
PSI (individualized Instruction)
Lecture-Discussion
Simulations and Games
Mountain Retreats
Computer Assisted Instruction
Classroom Television
Musical Classroom
Learning Packages
Case Studies
Role Playing
Open Classrooms
Drop out of school

E. Specify the Constraints

The instructional developer offered a suggestion at this point: "Would it be possible to examine these approaches, note the limitations of each approach, and also list the constraints faced by us in teaching our courses. Margy thought that the plan might be useful to follow.

Geoff objected. He said, "Dean, your priority should be turned around; how about starting with the constraints faced by the instructors and students exposed to our course?" "Yes, let's do that!" Susie quickly responded.

What constraints would you list that might be critical before adopting an alternative form of teaching or creating a new or modified teaching approach?

Feedback E. Ella responded that perhaps the cost alone of adopting an alternative approach could keep one from using a few of these alternatives. "Hey, guys," Susie said, "I've got my list of constraints; here they are."

1. The **cost-effectiveness** of the teaching approach; that is, is there a savings to the university in terms of expenses involved?

2. The **feedback to students** in guiding their learning; is it immediate or delayed?
3. What **intellectual level** is the alternative capable of handling--simple recall (comprehension), application, analysis, evaluation, or synthesis?
4. **Peer and supervisor approval**--will the department approve of the "new" teaching idea?
5. **Time** to prepare materials and revise as necessary.
6. **Room size** necessary, and limits on class enrollment.
7. **Media** necessary to teach students.
8. Amount of **student assistance** and help available.

The instructional developer added that, "I am impressed with your list; are there other constraints that can be added?"

Ella added a few more:

9. Will the teaching approach **guide** the students' learning?
10. Will it provide for **practice**, both in and out of class?
11. Will **evaluation** be frequent?
12. Will students be **motivated** by the teaching approach?
13. Will **individual needs and opportunities** be taken into consideration?

Geoff asked, "What do we do now?"

F. Analysis

The group thought that it would be difficult to go on listing further constraints, and accepted the list. The instructional developer asked, "Would it be possible to look at the advantages of each approach and list these? Then, we could apply our list of constraints to each approach and rule out some of the methods." The group decided to consider the following teaching approaches from their list:

A. Individualized Instruction (PSI)
B. Small-group discussion (Guided Design)
C. Lecture-discussion
D. Computer-assisted Instruction
E. Instructional Television
F. Simulation and Games

Margy suggested "That maybe we should list the advantages and disadvantages of each teaching approach."

Feedback F.

A. Individualized Instruction

Advantages

1. Students can work at their own pace.
2. Individual's needs are taken into account.
3. Students can receive individual aid from tutors or from the instructor.
4. Students can master the materials.
5. Study guides break units into small learning segments.
6. Evaluation and Feedback are immediate.

Disadvantages

1. Instructors must be prepared to handle students' procrastination.
2. An efficient system of bookkeeping is necessary.
3. Tutors are necessary to help grade students. (If not available, this causes problems.)
4. Most teaching occurs on the knowledge and comprehension levels, and the usual method of learning is to memorize.

B. Small-group discussions

Advantages

1. Decision-making strategy (Guided Decision-Making) can be taught and students can be guided through content material.
2. Students learn to use other students as resources for gathering knowledge and information.
3. Analysis, Synthesis, and Evaluation intellectual levels can be taught and reached.
4. The instructor can take on a new role as facilitator and becomes a viable resource to groups.
5. Feedback is immediate.
6. Students are applying subject content to real problems.

Disadvantages

1. Small-group discussion is limited to small classes of twenty to thirty-five students.
2. The groups may have internal personality problems and a few individuals may not work.
3. Grading group work may be difficult.
4. The students pass or fail as a group, with no differences in grade allowed for individual effort.

C. Lecture--discussion

Advantages

1. A large group of people may be taught by one instructor.
2. The lecture is the most widely used and accepted delivery method.
3. The element of flexibility is always apparent.
4. Lecture notes may be used term after term.

Disadvantages

1. Students follow at a rate established by the experience and pace of the instructor.
2. Students receive no direct-practice experience, motivation, or individual help.

3. Students experience a lack of involvement or stimulating mental activity.
4. Students may not feel comfortable raising questions of requesting further discussion on specific points.
5. Faculty members may not be prepared to lecture or may lack preparation and appropriate delivery skills.

D. Computer-Assisted Instruction

Advantages

1. Students are not embarrassed when errors are made, as there are no human monitors.
2. Students receive practice and rapid feedback, and become motivated by success.
3. Units are broken into small segments, often using a programmed instructional format.
4. A wide variety of programs may be available, teaming efforts of instructors from several universities.
5. Learning is self-paced and individualized.

Disadvantages

1. Students are not necessarily guided in applying subject content, but are often directed to memorize without learning how to use the subject content.
2. Initially, computers are expensive and not cost-effective.
3. Students often have a fear of computers.
4. It may be very difficult to generate specific instructional programs or locate commercially-made units.
5. Computers are subject to "Murphy's Law."

E. Instructional Television

Advantages

1. Video-tapes may be used to provide practice, give feedback, motivate, and individualize.
2. Video-tapes may be used as an appropriate substitute for the instructor as necessary.
3. Small objects used in demonstrations can be magnified with a close-up lens for increased visibility.
4. Instructors may improve classroom performance by viewing video replays.
5. Several teaching activities can be stored and used for future viewings.

Disadvantages

1. Television equipment requires maintenance and is subject to breakdown.
2. The expense of using this teaching method is high.
3. Instructors may face "attitude" problems on the part of colleagues, superiors, students, or the public.
4. Television users face a compatibility problem with non-standard equipment.

F. Simulations and Games

Advantages

1. This form of learning provides practice, quick evaluation, motivation, and individual work for students.
2. Students may enjoy this activity, and they tend to feel that there may be carry-over to the real world of work.
3. Theoretical concepts can be demonstrated.
4. Games are a form of play, and may be viewed as fun experiences.
5. Group projects may deliver new facts, creations, or goods which can contribute to greater understandings.

Disadvantages

1. Groups may choose not to work together.
2. Students are not necessarily guided through projects.
3. Students may not like to perform their game assignments.
4. Individuals are given group grades and are not rewarded for individual effort.

G. Evaluate and Make a Decision

Susie was quick to point out that "The defects in each approach are kind of obvious, aren't they? What we need is to use the best of each approach and maybe create a new method. Is that possible, Dean?"

The instructional developer thought that it was. He said: "I'm sure that we can improve upon the lecture method. After all, we already know that the lecture form is not working, according to reports." And he provided the following examples:

(Postlethwait, 1972)

> Lectures are widely used because we are so familiar with the technique and it is reinforcing to the instructor.

(Gage and Berliner, 1975)

> Retention from lecture is poor...the "forgetting curve." With notes and outlines, students remembered 24% immediately after the lecture; one week later, the same students remem-

bered 17% of the material.

(Bloom, 1968)

Approximately 30% of a listener's thoughts were found to be irrelevant to the lecture topic and 14% were passive. Irrelevant and passive thoughts occur twice as frequently in lectures as discussions.

(Cameron, 1968)

In 21 random samples of time during a semester's lectures, 20% of the students were thinking about sex and only 20% were paying attention to the lecture.

(Keller, 1974)

Lectures work best in disciplines where practitioners agree on the major concepts, principles and skills.

Lectures work best for conveying knowledge or organizing various sources for students, to motivate them.

Research shows there is little difference between tape recorded lectures, written lectures and live lectures.

Efficient technique to get a lot of information out quickly. The instructor can synthesize information and motivate.

(Ebel, 1976)

Tape recorded lectures at the graduate level were as acceptable and as effective as conventional lecture-discussion methods.

Students remembered more from a dynamic lecture than from a static one.

(Ulrich and Pray, 1965)

Students who were both allowed and required to study on their own did as well as those required to attend formal lectures.

(Dubin and Taveggia, 1968)

A review of over 100 studies over a 40 year period showed that 51% of the studies favored the lecture method while 49% favored the discussion method. Similar results were found for seven studies comparing lecture and lecture-discussion, also in 14 studies of lecture vs. supervised independent study. Unfortunately, the dependent variable usually was the final exam which was textbook-oriented. Both groups of students thus had a chance to study the text on their own regardless of method used.

(McKeachie, Blight, 1972; Costin, 1972)

These writers have concluded from their reviews of many studies that the lecture method is suitable when 1) the basic purpose is to disseminate information, 2) the material is not available elsewhere, 3) the material must be organized and presented in a particular way for a specific group, 4) it is necessary to arouse interest in a subject, 5) the material needs to be remembered for only a short time and 6) it is necessary to provide an introduction to an area or directions for learning tasks to be pursued through some other teaching method.

They also argue that lectures are inappropriate when 1) objectives other than acquisition of information are sought, 2) long-term retention is desired, 3) the material is complex, detailed, or abstract, 4) learner participation is essential to the achievement of the objectives, 5) higher cognitive objectives are sought (such as analysis, systhesis, or integration), or 6) the students are average or below average in intelligence or educational experience.

(Gage and Berliner, 1975)

...warn that administrative concerns may well override the educational points made above so we should try to improve the methods as much as possible since it is widespread.

"No wonder that the students react negatively to the present lecture format," Margy remarked. "I can agree with some of the findings, but how about getting back to our goal of developing a new teaching approach. Susie reported the difficulties with other alternatives, but it might be possible to use components of each of these alternatives."

"Okay," agreed the instructional developer, "Why don't we list those advantages from each approach that would best fit the list of constraints from our earlier work?" **Refer to your list of constraints and study the advantages and disadvantages of each approach, then list the components from each approach which could be used to create a new teaching method.**

Feedback G. The group came up with the following components that they liked:

A. Individualized Instruction
   - Individual needs are taken into account
   - Students can master the materials
   - Study guides which break the units into smaller learning segments

B. Small group discussions
   - The group felt that all of the advantages were valuable.

C. Lecture-discussion
   - A large group of people may be taught by one instructor.

H. Synthesis

The instructional developer concluded that the group's decision was to retain the lecture with modifications. Those modifications are as follows:

Study Guide

Develop study guides for each lecture. Each guide was to include a pre- and post-test to evaluate students' learning, a procedure section, objectives, lecture notes, and reading assignments. Units would be broken into smaller content-segments allowing for individual needs and subject mastery.

Lecture Format

Break the lecture into two parts with a discussion in between. Students could respond, in groups of two, to a discussion question, thus providing **feedback** to the instructor on how the readings and lecture are being applied to a real-world problem. Students would receive an immediate **feedback** sheet from their instructor for checking their work.

Small-Group Work

The group discussion could be used to guide student work, train students in decision-making, and provide immediate feedback to students applying knowledge from readings and lectures to real-world problems. "Since this approach uses feedback from the students and instructor, let's call this approach the **Feedback Lecture,**" the instructional developer suggested.

The group agreed and Susie asked, "Dean, can you describe to others how to implement this new approach?"

I. Implement the Decision

How to Implement this Approach (Feedback Lecture)

Each lecture is organized into a specific content area with learning bridges (transitions) between each lecture. The lectures are supplemented with study guides that are used by the students before, during, and after the class. In effect, the lecture becomes the audio-tutorial while the students are guided through the learning sequence. The components of the study guide are very important to the overall concept of the Feedback Lecture and are described below:

1. **Cover Design and Title**
   The cover illustration is an eye-catching theme designed to open the student's mind to a "bird's eye" view of the content to follow. Such designs, usually abstract patterns or drawings, suggest to the students key concepts to be presented during the lecture, and place these concepts into a concrete illustration of subject-matter. The title, unit, lecture number, and page number are placed on the title page for coordination purposes.
2. **Procedures**
   Page two is the procedural page. On this page is a description of the Feedback Lectures and suggested procedures for studying for the lecture. Such suggestions on how to use the pre- and post-test, most effective ways to use the study guide, and inspirational thoughts are provided.
3. **Introduction**
   Page three presents the Introduction to the Unit, presenting a descriptive theme designed to join the cover design and content information together in an overview of what is happening in the unit and/or lecture.
4. **Objectives and Terminology**
   Page four lists the objectives and terminology specifically developed or used in this lecture. The objectives are few in number, and are accomplished during the lecture-and-discussion period, which is 50-60 minutes long. The first twenty minutes consists of conventional lecture. This is followed by an eight-minute discussion period, and a second twenty-minute lecture period. By reducing the number of objectives to cover, the instructor has time to explain each point fully, including its restatement. An immediate revelation comes to those instructors using Feedback Lecture for the first time; too much material was covered before, and at too rapid of a pace. Therefore, the reduction in coverage plus making students more responsible for learning content outside of the classes does two things: (1) the extraneous content areas are reduced or eliminated (jokes, stories, some personal materials are still included), and (2) the instructor has adequate time to cover pertinent information.
5. **Pre-Test**
   The pre-test is located on page five. This device tells the students what they have gained from the readings prerequisite to the lecture. This test is not graded and answers are supplied for them at the bottom of the page. The pre-test tells the students what they have not acquired and serves as a non-threatening test, providing practice and perhaps helping to eliminate test anxiety.
6. **Lecture Outline**
   The lecture outline begins on page six and continues to page seven. The notes provided on page six are covered during the first twenty minutes of lecture, and are discussed between the first and second halves of the lecture. Research has indicated that learners are best at handling fifteen to twenty minutes of absorbing content and activity at a setting, followed by activity designed to reinforce learning. This activity can be flexible, allowing for discussions, laboratory activity or simulations. The notes that are provided are main points, guiding the instructor through the

delivery. It is recommended that the instructor not read through these notes, but use the notes as a guide to illustrate content information.

7. **Discussion Questions**
As previously stated, the discussion question provides an involving and participating stage for students near the end of the first half of the lecture. Students pair up and respond to the questions(s) developed for this particular Feedback Lecture. The students must apply the knowledge that they have gained through the pre-requisite readings, the pre-test, the procedural page, and the first half of the lecture. The discussion-question sheet is usually placed on the far left of rows to speed up handling and usage. When the instructor completes the first half of the lecture, the students write their answers to the discussion question. These responses are graded later. Points are determined by the instructor's criteria for an ideal response. Once the students turn in their response, the **discussion-question feedback** is passed out. The feedback reinforces the correct concepts that should have been applied to the discussion question, and it models professional reasoning and application.
(Note to potential adopters of the Feedback Lecture: before the students purchase the study guides, remove the **discussion question** and **discussion question feedback** from the study guide packet. These should be passed out at the appropriate lecture during the break between the first and second part of the lecture.

8. **Second Half of Lecture**
The second half of the lecture continues and can be followed by a second discussion, depending upon the instructor's desires.

9. **Post-Test**
Page ten of the study guide presents a post-test. Students can take this exam in or out of class, again depending upon the instructor's preference. The post-test serves as an immediate feedback to the student as to the concepts, facts, or information learned in the unit.

10. **Warm-Ups**
Page eleven is used for listing tasks students must perform prior to the next lecture. Usually this page is called Warm-Ups. Reading assignments, speakers to hear, video-tapes to view and other media to use are listed. These warm-up activities are to be completed prior to the next Feedback Lecture.

11. **Glossary**
The last page(s) of the study guide may be used for a glossary, a reference page, or for notes from the instructor to the students.

J. Sample of Study Guide

Susie asked, "Would it be possible to provide a sample study guide?" "Since we are working on my class in Clothing, Textiles, and Related Arts," Ella suggested, "why don't we construct a study guide for the Economics of Clothing lecture and use it as a sample to show others?"

"If you have your existing lecture notes, we can list the objectives to be covered and follow the 'How Tos' of creating a study guide for feedback lectures," answered Dean.

The group proceeded to construct a study guide using the guidelines as provided.

K. Check the Results

Margy said, "Are there any results available; I mean has anyone experimented with this form of teaching to determine if students learn or even like it? Perhaps students would not like it at all!"

Susie added, "Dean, haven't you been developing this teaching method for some time now? Do you have any data results yet?"

"Yes, a study has been done at Oregon State University (Progress Report on Improvement of Instruction by Howard P. Milleville, Extension Food Technologist, Department of Food Science and Technology, February 10, 1978) to determine if the lecture study-notes, pre-and post-tests, and study guides would contribute to student achievement and to positive attitudes toward the lectures. A review of the data indicates that the study guides and ten-minute discussion period positively reinforced learning. And the students' response to the attitude questionnaire regarding the teaching format was positive," Dean replied.

"Are there any reports from recent adopters of the Feedback Lecture, presenting their experience with this form of teaching?" asked Nancy.

"Yes," said Dean, "I can provide you with a case study done by Betty Coffey at Montana State University. She is a recent adopter of the Feedback Lecture; you may be interested in her observations and modifications."

Case Study—Feedback Lecture

The author, Betty Coffey; Instructor, Industrial Engineering/Computer Science Department, Montana State University.

Two introductory computer-science (CS) programming classes at Montana State University (MSU) are offered for non-degree CS students. Many curricula on campus require a computer-science class, and others recommend a CS course as an elective. CS 101 is offered for Engineering and Science students while CS 111 is offered for students having little math background. These two courses are offered every quarter, and the population of these courses has increased considerably from year to year, as the figures given in Table 15-1 show.

Table 15-1. Class enrollments for CS101 and CS111 by year.

	CS101	CS111
1973 - 1974	212	60
1974 - 1975	314	99
1975 - 1976	348	109
1976 - 1977	404	118
1977 - 1978	398	141
1978 - 1979	467	246
1979 - 1980 (autumn and winter only)	276	196

When the author was a high-school teacher, a class of 35 students was considered large because in such a class individual contact with students was fairly restricted. The CS 101 and 111 classes, ranging in size from 80 to 150 students, have made it difficult to establish any individual contact at all with students. The traditional lecture method appeared to be a necessary format for these classes, but it was difficult to be relaxed and to interact with the students. "All those students sitting with pencils poised, waiting to copy every word!" Factual information can be transmitted in this way, but it is difficult to be sure that the students understand the ideas which are presented.

Dissatisfaction with the teaching format was the main reason for the author's participation in an instructional development workshop presented for the MSU faculty. A number of instructional techniques were offered in the workshop, but the feedback lecture described by Dean Osterman seemed to be the best method to incorporate into large lecture classes. Fortunately, at the time of the workshop the author was teaching a summer-school class, and the students were willing to be guinea pigs to test out this new approach. Study-guide units were developed day-by-day for the class. The format for the units was an abbreviated version of the recommended structure. Each unit had an introduction, a list of objectives, a glossary of terminology, and lecture outlines for one or more lectures, as well as discussion questions and feedback. Each unit covered a particular segment of the curriculum. Pre-and post-tests were not included because of the time factor.

In class, after the first part of the lecture was presented, students were given the discussion questions and worked together in pairs. They became active participants in the class, not passive watchers. Students learned from each other which concepts they didn't understand, and could get help from the instructor at this time. This part of the class was the most exciting because the students seemed to come alive and their enthusiasm was felt by the instructor. How can a student not listen more closely to a lecture when they know that soon they'll be answering questions directly related to the material, and sharing their knowledge with another person?

The summer-school class tested the original units and made recommendations concerning what they did or did not like about them. Using these data, the original units were rewritten and additional units were developed.

The new study guides were used for the fall with classes of 150 and 110 students. These classes were the big test. The feedback lecture had been well-accepted by the class of 30 students, but would it work effectively with a larger class? During the Fall Quarter, discussion questions were passed out during the class, students answered the questions, turned in ONLY the answers, and then received the feedback to the questions. The process worked smoothly, but the students had many loose sheets of paper scattered in their notes.

The students were asked to evaluate the study guides and the feedback-lecture method halfway through the Fall Quarter. A re-writing and expansion of the guides was considered, and the author wanted to know if it was worth the time and effort. Also, was there any way to eliminate all the loose paper? The response to the study guides was overwhelmingly positive. The guides were an additional expense for the students, but they definitely felt they were worthwhile, and questioned why other professors didn't use a similar method.

Students liked having the lectures outlined for them. Their comments mentioned that their notes were better organized, that they appreciated knowing what to expect in the next lecture, that they were better able to study for tests, that the many examples in the guide helped in writing the assigned computer programs, that their notes were more ordered, extensive and precise, and that they were able to pay closer attention to the lecture since they did not have to write as much now that the programs and examples were included in the guide.

The study guide included many program examples that, in the past, had been written on the board. This took class time, and often students would be copying from the board instead of listening to the explanation of the program. The examples are also on overheads so that they could be discussed more thoroughly while being projected. As one student mentioned 'copying programs is a drag.'

In addition, they felt that the discussion questions and mid-class break were "A breath of fresh air," allowing the students to wake up and start functioning again. Other student comments

concerning the discussion questions were: renews interest; stops boredom; answering the questions produces a feeling of understanding; allows the student to ask a specific question; helps students to get involved; 'I could not listen to anyone that long'; makes lecture shorter; 'gets you thinking about the lecture, and makes me listen more closely.' Very few preferred taking their own notes or listening to a traditional lecture.

Figure 15-4 presents a list of the questions asked at the midpoint of Fall Quarter. A breakdown of the students' response is presented in Table 15-2. (Responses to Question 3 and the additional comments are not included.)

Figure 15-4. Evaluation for CS 101 and 111

The use of the Study Guide and Lecture Outline is new this quarter. I would appreciate an honest response from you in order to determine its worth to you, the student.

Study Guide and Lecture Outline:

1. Is the Guide helpful in understanding the material presented in class?
2. Would you rather take your own notes without the Guide?
3. Can you suggest any revisions or additions in the Study Guide? (Be as specific as you can).

Any additional comments?

Discussion Questions:

4. Are the discussion questions during class helpful in understanding the material presented?
5. Are the discussion questions helpful in studying later?
6. After the break for the discussion questions, are you able to again concentrate on the lecture?
7. Would you prefer a straight lecture without the discussion questions?

Any additional comments?

Table 15-2. Responses to evaluation.

Student Responses - 180 Total

Question #	Response		
	Yes	No	Indefinite
1	171	2	7
2	7	165	8
3	(written response)		
4	156	13	11
5	139	17	24
6	155	6	19
7	14	158	8

Based upon the responses to this evaluation and upon many consultations with students concerning the questions and the feedback, the author decided to incorporate the discussion questions into the study guides. The questions are now located at the end of each unit, and the feedback is in an appendix at the end of each guide. The questions are used as a learning aid and not for test purposes. The answers are not graded or returned. Students attending class and participating in discussions can earn extra credit-points. The students can earn 500 points; these points are distributed among tests (205), homework assignments (245), and a paper (50). A total of 12 extra credit-points can be earned through participation in the discussions.

The author has no doubt that the Feedback Lecture is in every way superior to the traditional lecture. Both the students and the teacher gain more from a class using this method.

Anyone interested in developing the Feedback Lecture should probably begin small and expand gradually, unless extra time is available for development. Start by incorporating the discussion questions into your class. Then begin writing the lecture outlines for particular units or topics. It may take time to develop the whole series, but this helps to better organize the lectures for classes.

Remember, the guides don't have to be perfect and will probably never be finished. The study guide is an outline which can be general enough to adapt to change and can always be expanded. It is a flexible method for presenting ideas as you are delivering supporting content. The lectures are an outline, not a total picture. The use of discussion questions will be an improvement for the students, will increase active participation in the class and, hopefully, will increase the students' enthusiasm for and knowledge of the course.

In conclusion, the Feedback Lecture utilizing the study guides and discussion questions improves presentation in large lecture classes by:

1) organizing the content of the class;
2) having students become active participants in the class; and
3) providing students with reinforcement and giving them a daily awareness of material instead of just at test time.

L. Evaluate the Results

Susie and Ella, then, followed the guidelines as provided above, and developed study guides for the Feedback Lecture form of teaching and learning for use in their Clothing Textiles and Related Arts course. Others followed the lead of Susie and Ella, and are now currently using this form of teaching. (Final exams in these courses produced higher mean scores than in comparable traditionally-taught courses.) Working with the author, an attitudinal questionnaire was developed for evaluating the **Feedback Lectures.** The form and results are presented in Figure 15-5 and Table 15-3, respectively.

Feedback L. Information, Results. Over a three term study with an average class load of ninety-one students per term, Ella and Susie received higher scores in student evaluations, and positive responses from colleagues and administrators. The results of the evaluation (compiled over three terms and averaged, with data representing a total of two hundred and seventy-three students) were as follows:

COMMENTS

The Feedback Lecture is an attempt to apply learning principles and improved conditions to the learning tasks via the lecture format. Certainly other forms of teaching may produce similar or improved results. But the **Feedback Lecture** provides a compromise between the tradition of lecturing and the use of innovative techniques. The learning components found in the Feedback Lecture are:

1. repetition and reinforcement,
2. increased student involvement and activity,
3. organizational factors which increase the efficiency of memory,
4. motivation through participation in small groups,
5. opportunity to exercise decision-making skills,
6. positive guidance and direction.

By redesigning one lecture into the Feedback Lecture format, the instructor should discover that the experience benefits both the students and the teacher. Once the instructor has acquired this experience from using one Feedback Lecture, additional Feedback Lectures can be added to the course.

Figure 15-5. Evaluation of feedback lectures.

Section One

Please respond to each of the following questions by circling the number that best represents your attitudes regarding Feedback Lectures:

1.	How much did you use the study guides?	Always 4	Often 3	Seldom 2	Rarely 1	Not at all 0
2.	Did you find that the study guides were useful?	Extremely Useful 4	Helpful 3	Just OK 2	Distracting 1	Not at all 0
3.	Did you find it helpful to have the objectives listed in the study guides?	Extremely Useful 4	Helpful 3	Just OK 2	Distracting 1	Not at all 0
4.	Did you answer the pre-test and post-test included in the study guides?	Always 4	Often 3	Seldom 2	Rarely 1	Not at all 0
5.	Did you use the lecture outline in the study guides for studying and/or taking notes during lecture?	Always 4	Often 3	Seldom 2	Rarely 1	Not at all 0
6.	What did you think about the break (pause) in the lecture to allow for discussion with a partner?	Extremely Useful 4	Useful 3	Just OK 2	Distracting 1	Not at all 0

Figure 15-5. Evaluation of feedback lectures. (continued)

		YES	NO	UNDECIDED
7.	Did you like the idea of the discussion with a partner?	2	1	0
8.	Did the printed feedback supply information that contributed to your understanding of the discussion questions?	2	1	0
9.	Did you like the idea of knowing what is expected of you prior to attending the next Feedback Lecture?	2	1	0
10.	Do you think that the Feedback Lecture as a teaching/learning method helped you to understand the subject material?	2	1	0

		Regular Lecture	Feedback Lecture
11.	If you have a choice in the future between a regular course and a course using Feedback Lectures, which would you prefer?	2	1

Section Two

By circling a number rate the quality of the Feedback Lectures in terms of the degree to which they:

		Excellent	Good	Fair	Poor	Not Applicable
12.	Held your attention and interest	4	3	2	1	0
13.	Covered the material at an appropriate intellectual level--neither too complicated not too simple	4	3	2	1	0

Figure 15-5. Evaluation of feedback lectures. (continued)

	Excellent	Good	Fair	Poor	Not Applicable
14. Clearly presented the relevant subject matter	4	3	2	1	0
15. Stimulated your curiosity	4	3	2	1	0
16. Stimulated student discussion outside of class	4	3	2	1	0
17. Were related to one another and followed a coherent sequence	4	3	2	1	0
18. Were coordinated with other parts of the course	4	3	2	1	0
19. Rate the quality of the study guide, audio-tutorial materials used in class, and lectures in Feedback Lecture Format	4	3	2	1	0
20. In comparison with all other core courses in Home Economics at Oregon State University, how would you rate the Feedback Lecture section in this course?	4	3	2	1	0

Section Three (use the back, if needed)

Comments:

Table 15-3. Results in Percentiles.

N=273

Section One

1. How much did you use the study guides?	Always 5%	Often 89%	Seldom 24%	Rarely 0	Not at all 2%
2. Did you find that the study guides were useful?	Extremely Useful 10%	Useful 82%	Just OK 8%	Dis-tracting	Not at all
3. Did you find it helpful to have the objectives listed in the study guides?	Extremely Helpful 81%	Helpful 10%	Just OK 6%	Dis-tracting	Not at all 3%
4. Did you answer the pre-test and post-test included in the study guide?	Always 21%	Often 72%	Seldom 5%	Rarely 2%	Not at all 1%
5. Did you use the lecture outline in the study guides for studying and/ or taking notes during lecture?	Always 89%	Often 7%	Seldom 2%	Rarely	Not at all 2%
6. What did you think about the break (pause) in the lecture to allow for discussion with a partner?	Extremely Useful 20%	Useful 79%	Just OK 1%	Dis-tracting	Not at all
		YES	NO	UNDECIDED	
7. Did you like the idea of the discussion with a partner?		81%	1%	18%	
8. Did the printed feedback supply information that contributed to your understanding of the discussion questions?		79%	2%	19%	

Table 15-3. (continued)

	YES	NO	UNDECIDED
9. Did you like the idea of knowing what is expected of you prior to attending the nest Feedback Lecture?	93%	2%	5%
10. Do you think that the Feedback Lecture as a teaching/learning method helped you to understand the subject material?	90%	1%	9%

	Feedback Lecture	Regular Lecture
11. If you have a choice in the future between a regular lecture course and a course using Feedback Lectures, which would you prefer?	88%	12%

Section Two

By circling a number rate the quality of the Feedback Lectures in terms of the degree to which they:

	Excellent	Good	Fair	Poor	Not Applicable
12. Held your attention and interest	20%	78%	1%		1%
13. Covered the material at an appropriate intellectual level--neither too complicated nor too simple	71%	17%	10%		2%
14. Clearly presented the relevant subject matter	74%	20%	3%		3%
15. Stimulated your curiosity	10%	61%	20%		9%
16. Stimulated student discussion outside of class	5%	12%	58%		25%
17. Were related to one another and followed a coherent sequence	73%	20%	4%		3%
18. Were coordinated with other parts of the course	5%	82%	10%		3%

Table 15-3. (continued)

	Excellent	Good	Fair	Poor	Not Applicable
19. Rate the quality of the study guide, audio-visual materials used in class and lectures in Feedback Lecture Format	7%	91%			2%
20. In comparison with all other core courses in Home Economics at Oregon State University, how would you rate the Feedback Lecture section in this course?	79%	15%			6%

In putting together the content materials for each one-hour lecture session of a Feedback Lecture course, it is advisable to use an outline such as the following:

Unit Outline

Unit #, Lecture #

1. **Topic:** What is the content to be covered in the lecture?
2. **Specific Concepts to be Developed:** What are the main ideas to be developed?
3. **Supportive Illustrations or Graphs:** What can be said through the use of visuals?
4. **Prerequisite Assignments, Readings:** How can students prepare for the lecture?
5. **Procedures:** What suggestions can be made to guide the learning activities?
6. **Theme:** What is the central idea of the lecture?
7. **Objectives (Student Outcomes):** What is expected of students?
8. **Abstract of Information to be Covered:** In a few words, what is the lecture all about?
9. **Pre- and Post-test:**
10. **Content Outline (Notes):**
11. **Discussion Question:**
12. **Discussion Question Feedback:**
13. **Student Assignments & Activities (Feedback Activities):**
14. **Warm-Up Activities:** What extra-credit assignments can be offered?
15. **Glossary, References, Instructor Notes:**

Components of Feedback Lectures

The Feedback Lecture is part lecture, part student involvement. The foundation for this method has been described in the previous pages. The components are as follows:

1. **Organized units** with coordination from beginning to end;
2. **Lectures** that provide uniformity, clarity, and space for adequate content coverage;
3. **Feedback Activity** for the instructor and students to guide the teaching/learning process;
4. **Feedback-Lecture Study Guides** with
   a. cover design and title,
   b. procedure page,
   c. introduction (theme) page,
   d. objectives and terminology page,
   e. pre-test page,
   f. lecture outline (first half) page,
   g. discussion question,
   h. discussion-question feedback,
   i. lecture outline (second half) page,
   j. warm-up activities page,
   k. glossary, references, instructor notes page;
5. **Learning Principles.**

CONCLUSION

There are other methods for supplying feedback to the instructor and to the students. The electronic circuit-board providing buttons at each student table or desk, wired to a computer with a response-display for the instructor, is useful for providing and obtaining feedback. Such devices are used in colleges and universities to increase awareness and motivation and to assess knowledge. Students are provided with response buttons which feed back information to students either from tests, from responsive questions, or from other activities wihch can be conducted during the lecture. Flashcards, response wheels, and other pa-

per-coded feedback cards can also be used for providing rapid feedback during the lecture. These devices are useful and can be built into the Feedback Lecture format when appropriate.

APPENDIX I: CREATING THE FEEDBACK-LECTURE STUDY GUIDE

Before beginning work on their own Feedback Lectures, instructors should examine an already-existing study guide for such a course. Such an example has been provided in Appendix II. Then they should begin by following the 14 steps listed in Figure 15-6. First efforts should probably be confined to producing a single lecture with its accompanying study guide. The further development of the course consists simply of duplicating this procedure for each lecture.

Moving Right Along

Now that you have defined a topic and delimited a unit of instruction, you have the beginnings of the Feedback Lecture. Using the information steps 1-14, apply this information to the lecture. You will create a study guide that will be used prior to the lecture, during the lecture, and after the lecture.

Sample Study Guide

The study guide found in Appendix II was produced using steps 1-14 above. These steps and this example are provided for an instructor to follow.

Improving the Lecture

In an effort to improve upon the lecture, redesigning it to eliminate as many disadvantages

Figure 15-6.

Unit #_____ Lecture #_____

1. What is the specific title for this lecture?
   State the topic that you will cover during this one hour of instruction.
2. What specific concepts will be developed during this lecture?
   List these concepts.
3. What supportive illustrations or graphs can best be included as visuals to help the learner follow the content as it is being presented in an oral fashion?
4. What prerequisite assignments and readings will be necessary for the students to read to be prepared for this lecture?
5. What procedures can you suggest which will enable the students to study for this lecture and follow the flow of information presented?
   How can you guide the students?
   What can you suggest for the student to do, in order to best learn the content material?
6. What is the overall theme or the central idea of this particular lecture?
7. What do you expect the students to be able to do as a result of studying and learning from the lecture?
   What are your objectives for the students to achieve?
8. What is the basic information that you will cover during this lecture?
9. Jot out a few questions that can be used as a pre- and post-test for this lecture.
10. Outline the basic lecture that will be covered. This will serve as the notes for the students to follow.
    I.
    A.
    B.
    II.
    A.
    B.
11. What discussion questions would you like students to take time in groups of two to discuss in order to check their comprehension and ways of analyzing the material that has been presented during the lecture?
    List a few discussion questions that can be answered in a 5-8 minute period. These questions should ask students to apply the information that they've learned in such a way that they achieve at a higher cognitive level than simply repeating back information.
    1)
    2)
    3)
12. What study assignments and activities can you list which will serve as feedback activities to both them and you and which will involve the students during the lecture process?
    1)
    2)
    3)
13. List warm-up activities which will help prepare the students for this particular lecture. These warm-up activities need not be readings; they can be films, audio-tapes, or many other forms of learning experiences.
14. What terms can you list in a glossary which will help students listening to the lecture?
    1)
    2)
    3)

as possible, the author examined the constraints and limitations faced by the typical faculty member. In most cases, the professor is more or less fixed in a lecture track. The chairs in the classroom are either permanently attached or cannot be moved around to accommodate small group discussions. The professor lacks the time or skills to develop any alternative form of teaching.

The evaluator who provides peer or supervisory feedback for promotion-and-tenure proposes is unaware of alternative teaching methods and is accustomed to seeing good lecture performances. And the budget is set up to provide only for minimal facilities leaving no funds for equipment, proctors, teaching materials, and other innovative forms of instruction. So, what do you have left to work with? Obviously, the lecture. What can be done to improve it within the framework created by these constraints?

1. increase the involvement and participation of students;
2. cover less content in class, but thoroughly cover main concepts;
3. provide reinforcement to students through repetition and application;
4. test the students and judge audience understanding and reaction during the lecture;
5. provide a framework for students to follow in the form of objectives, make prerequisite knowledge easily available prior to the lecture, Xerox the main notes, insert a discussion, have a lecture theme, give follow-up assignments, provide related student activity both before and after.

How can these things be done within this framework?

The Feedback Lecture was created to handle these needs.

APPENDIX II

THE PHYSICAL FACTORS WHICH INFLUENCE THERMAL COMFORT or WHAT YOUR PARENTS DIDN'T TELL YOU ABOUT WHY YOU SHOULD WEAR A HAT

UNIT I, LECTURE I

Procedure for Section III, The Economic Aspects of Clothing

Study and Lectures for Section III, The Economic Aspects of Clothing, are based upon the concept of "Feedback Lectures." This packet is your study guide and includes objectives for each lecture, the reading and homework assignments, and outlines of the lectures and discussion questions which will be utilized during class. A pre-test and post-test accompanies each unit.

The most effective use of the study guide for each lecture is as follows:

1. Read the objectives.
2. Complete the pre-test.
3. Read the assignment.
4. Write definitions for the terms listed on the objectives page.
5. Check the answers of the pre-test with those provided at the bottom of the page.
6. Review the reading material for those questions which you missed.
7. Bring the study guide to lecture and use the lecture outline for note taking.
8. Use answers provided during the lecture to compare with your written answers to the discussion questions.
9. Complete the post-test.
10. Complete the homework assignment.
11. Repeat the process outlined in steps 1-10 for the next lecture.

Clothing is referred to as the "second skin" that interfaces with your psychological, social, aesthetic and physical environments. Humans can adapt to almost every environmental condition on the planet Earth--and beyond--by using clothing as a protective skin.

In Unit I of Economic Aspects of Clothing, we will be exploring a basic purpose of clothing, which is to assist the physiological functions of the human body to adapt to its immediate environment. Our goal is to expand your knowledge of the ways in which clothing can help to make your life comfortable. In the following three lectures we will talk about:

1. The art of keeping warm or cool--what one's body can do and what we as thinking beings can do.
2. How clothing can provide thermal comfort, safety and protection.
3. How clothing can extend our ability to perform in various climatic conditions or specific activities.

PHYSICAL FACTORS WHICH INFLUENCE THERMAL COMFORT

OBJECTIVES:

1. Identify one internal and one external means by which a person can maintain thermal comfort of the body.
2. Define the four processes by which heat is lost from the body.
3. Describe how body heat is lost by radiation, convection, conduction, and evaporation.
4. Describe the physical changes of the circulatory system to maintain body temperature.
5. Explain the processes of sweating and shivering to maintain thermal comfort.
6. Define and give an example of acclimatization.
7. Define and give an example of accustomization.
8. Identify some of the physiological differences between men, women, and children which affect the clothing required for thermal comfort.
9. List five environmental factors which affect thermal comfort.
10. Given the homework exercise that outlines differing climatic conditions and activity levels, list the considerations in selecting clothing to achieve thermal comfort in these situations.

TERMINOLOGY:
Physiological
Radiation
Conduction
Convection
Evaporation
Kilocalories
Asphyxia
Hypothermia
Acclimatization
Accustomization

Factors Which Influence Physiological Comfort

PRE-TEST:

1. Thermal comfort is created within the human body by:
2. Thermal comfort is maintained by _____ which creates a buffer or barrier between the body and its environment.
3. In cold weather, 50% or more of one's body heat is lost from the head, neck and ears by the process of:
   A. Conduction
   B. Convection
   C. Radiation
   D. Evaporation
4. A learned response which enables a person to adapt to the environment exemplified by carrying an umbrella on a rainy day is called:
   A. Acclimatization
   B. Accustomization
   C. Following mother's directions
5. The experimental factors which affect thermal comfort are:
   A. Temperature
   B. Temperature, humidity
   C. Temperature, humidity, air movement
   D. Temperature, humidity, air movement, solar radiation
   E. Temperature, humidity, air movement, solar radiation, atmospheric pressure

ANSWERS:
1. Body heat is generated by the metabolizing of food in the tissues and muscles.
2. Clothing acts as an insulator between the body and the environment to maintain the heat that the body has created or to allow this heat to dissipate when the body becomes overheated.
3. C. Radiation
4. B. Accustomization
5. E. Temperature, humidity, air movement, solar radiation, atmospheric pressure.

Physical Factors Which Influence Thermal Comfort

LECTURE OUTLINE:

I. Thermal comfort (refer to Horn, pp. 196-299)
   A. Maintain by two means:
      1. internal--metabolizing food in tissues and muscles
      2. external--insulating the body with clothing
   B. Body-heat transfer
      1. radiation
      2. convection
      3. conduction
      4. evaporation
II. Human physiological adaption to the environment (refer to Horn, pp. 301-303)
   A. Circulatory system
   B. Sweating
   C. Shivering
   D. Acclimatization
   E. Accustomization

(note: the lecture will stop at this point and the discussion will begin; please pair up in groups of two's and answer the question(s) on page 1-8. When completed (or after 8 minutes) turn in your response and collect a discussion-question feedback. The lecture will begin again after the discussion period. The discussion-question feedback is removed from your study guide)

Physical Factors Which Influence Thermal Comfort

LECTURE OUTLINE: (continued)

III. Individual physiological differences
   A. Metabolic rate
   B. Physical condition of the body

C. Sex
D. Age

IV. Influence of environmental factors (refer to Horn, pp. 299-301)
A. Temperature
B. Humidity
C. Air Movement
D. Solar Radiation
E. Atmospheric pressure

V. Need for clothing is determined by:
A. Food intake
B. Physical activity
C. Physical condition of the body
D. Extremes of temperature
E. Duration of exposure to adverse environment

DISCUSSION QUESTIONS:

Your living group has "adopted" two elementary children and you have volunteered to spend a day at the coast acquainting them with the flora and fauna. Saturday noon you and a friend of the opposite sex pack a picnic lunch, and put it in the trunk of the car so that no one can snack en route. The sun is shining, the temperature is 27°C (81°F) in Corvallis and everyone is dressed for thermal comfort on a warm fall day.

You drive for three hours without stopping. As you approach your destination you see a squall line developing over the ocean and when you get out of the car, you feel the cool ocean breeze. You immediately feel chilled and start to shiver.

1. What are the physical reasons that you feel chilled?
2. What processes of body-heat transfer are occurring?

The children are so exhilarated that they run rapidly up and down the sandy beach. They are not shivering.

3. Explain why they do not have the same physical response to the change in weather that you had.

Soon the squall line moves closer, and they, too, begin to feel chilled. Your knowledge of the idiosyncratic coast weather alerted you to bring additional clothing so you provide everyone with a wool sweater and vinyl poncho.

4. Your learned response which enables you to adapt to environmental change is called_____.

DISCUSSION QUESTION FEEDBACK:

1. How many of the following reasons for feeling chilled did you list?
   a. sudden change in temperature from a warm environment and the protection of the car to a cooler temperature accompanied by chilling winds
   b. cloud cover reducing solar radiation (warmth from the sun)
   c. sedentary activity--sitting in the car for three hours
   d. low energy level due to lack of food intake for a considerable period of time.
2. Heat loss due to convection and radiation.
3. The children are involved in an intense physical activity creating body heat. In general, children have a higher energy level (metabolic rate is faster) than adults. Thus they do not need as many clothes when active.
4. Accustomization

Physical Factors Which Influence Thermal Comfort

POST-TEST:

1. From the following, select the only group which includes one external and one internal means of maintaining thermal comfort.
   A. eating and exercise
   B. turning up the thermostat and wearing long johns
   C. eating nutritious food, adding or subtracting clothing
   D. drinking cold beverages, eating salads and ice cream
2. The backpacker whose feet become wet from rain will lose body heat through:
   A. radiation
   B. convection
   C. conduction
   D. evaporation
3. The body speeds up heat loss as an adaptation to overheating by:
   A. shivering
   B. dilating the blood vessels
   C. sweating
   D. acclimatizing
   E. both B and C
4. An inactive, overweight person is not necessarily better insulated from heat loss in cold temperatures than the "average" person because:
   A. the circulatory system functions at a faster rate
   B. the circulatory system functions at a slower rate
5. If one's circulatory system functions at a slow rate, the skin temperature is:
   A. lower, making the person feel cool
   B. higher, making the person feel warm

ANSWERS:
1. C. eating nutritious food, adding or subtracting clothing
2. C. conduction
3. E. both B and C
4. B. the circulatory system functions at a slower rate
5. A. lower, making the person feel cool

ASSIGNMENT, LECTURE 2:
Horn, Chapter 15, pp. 303-310
Brain Warm-ups (on following page)

BRAIN WARM-UPS
(alias homework exercises to be completed before Lecture 2)

Warm-Up I

It is late February and you are planning a weekend cross-country ski adventure in the Cascades. For the past four years you have lived in Reno, where you were introduced to the sport of Nordic skiing in the Sierra Nevada Mountains. You are eager to share this experience with your new friends in Oregon, who are novice skiers. They have asked you to prepare a list of clothing items that they should pack for the trip.

The environmental conditions in Nevada were as follows:

* Daytime temperatures reached 0 to 7 degrees C. (30 to 40 degrees F.).
* Crystal clear sunny days with afternoon winds of moderate to strong velocity.
* Relative humidity reaches 8% maximum.
* Elevation is approximately 2,360 meters (8,000 ft.).

You have been monitoring the weather reports in the South Santiam for the past week and they are summarized as follows:

* Daytime temperatures range from 0 to 3 degrees C. (30 to 35 degrees F.).
* Overcast days with intermittent sun.
* Relative humidity from 50% to 100% (rain turning to sleet in late afternoon).
* Elevation is approximately 1.475 to 1.770 meters (5,000 to 6,000 ft.)

Your skiing wardrobe while in Nevada included: cotton knit long-johns, cotton corduroy knickers, wool socks and hat, cotton turtleneck, wool V-neck sweater, nylon windbreaker, lined leather mittens and sunglasses with dark lenses. Your friends have decided to make the trip to the Cascades because of your enthusiasm and experience with the sport and your promise of a fun weekend. Considering the apparel used in Nevada, compose a list of clothing that will provide thermal comfort for the Cascades Adventure.

Warm-Up II

The following letter was written to you by a friend who graduated from Oregon State University last spring.

September 15, 1983

Dear _____,

My dietetics internship at Barnes Hospital, in St. Louis, Missouri, is an exciting challenge in many ways. I was fortunate to find a beautiful yet inexpensive new apartment, though I must walk six blocks to the bus and ride for 20 minutes to the hospital. Sometimes the bus air conditioning does not work, but when I arrive at the hospital, it is climate controlled at 21°C. (70°F). The daytime temperature highs in St. Louis have been between 21°C. (80°F) and 38°C (100°F) and relative humidity ranges from 50% to 95%, so my body must acclimatize to an environment that is distinctly different from Oregon. It is HOT!

One problem I have is selecting the proper clothing for work. We have a choice of wearing a white, polyester uniform or street clothes covered by a cotton laboratory coat with long sleeves. I know you are knowledgeable in this area and could list for me the considerations in selecting clothes to achieve optimal thermal comfort.

Please answer by Wednesday!

No sweat!

(Jane) (Jim)

P.S.
I met a neat member of the opposite sex on the bus yesterday!

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